

**REMARKS**

Claims 4-10 and 12-15 are currently pending in this application. Claims 1-3 remain withdrawn.

Claim 12 has been amended to properly recite a cracking furnace instead of a cracking surface. Applicants respectfully note that due to a typographical error, the term surface was introduced in the preliminary amendment of October 7, 2005 without markup. This term was replaced inadvertently and without deceptive intent. As the application has published with the term surface, Applicants have submitted this change as an amendment with markups as required by 37 CFR 1.121.

Reconsideration and withdrawal of the objections to this application in view of the remarks herewith, are respectfully requested, as the application is in condition for allowance.

**Claim Rejections under 35 USC §103**

Claims 4-10 and 12-15 stand rejected under 35 USC §103(a) over Link et al. (US 4,822,932) in view of Dummer et al. (US 4,822,932).

The Examiner states that Link et al. teaches a method of production of vinyl chloride by thermal cracking of 1,2-dichloroethane in a cracking furnace along with successive external heat exchangers and burners. The Examiner further states that while Link et al. fails to disclose the use of a quench column, Dummer et al. teaches a method for the production of vinyl chloride by thermal cracking of 1,2-dichloroethane using a quench column and a heat exchanger.

Applicants respectfully traverse.

The instant invention pertains to a process for the production of vinyl chloride by thermal cracking of 1,2-dichloroethane in a cracking furnace in which a medium pressure of from 1.4 to 2.5 MPa is maintained in the system. Further, *an externally heatable and separately regulatable heat*

*exchanger is provided* which allows for the prevention of pressure and temperature fluctuation in the system.

Applicants respectfully submit herewith a Declaration by Dr. Michael Benje, of Uhde GmbH, having expertise in EDC and VCM technology and inventor of several patents relating to the production of vinyl chloride.

According to the Declaration, Dr. Benje notes that Link et al. is directed to a process for the production of vinyl chloride by thermal cracking of 1,2-dichloroethane wherein the thermal energy of the cracking gas (i.e. the gas leaving the cracking furnace) is utilized to heat liquid 1,2-dichloroethane in a heat exchanger. This heat exchanger according to Link et al. corresponds to the EDC vaporizer 4 as shown in Figure 1, sheet A of the present application. *This heat exchanger which is used according to Link et al. is not externally heatable and separately regulatable.* Therefore, pressure and temperature fluctuations in the system according to Link et al. can not be prevented.

Both Applicants and Dr. Benje note that the formation of by-products is significantly lower in the process according to the present application when compared with Link et al. (See Table on page 5 corrected version). Similarly, the furnace operating time between cleaning periods is nearly twice as high for the process according to the present application when compared with the process according to Link et al.

Dr. Benje further notes the cleaning of the furnace takes up to two weeks and therefore, the furnace operating time has a significant influence on the output and the productivity of a process. In the present case, two weeks correspond to a loss of productivity of 2.5%. In total 35 million tons of vinyl chloride are produced every year. Therefore, in the production of a product at such a large scale, an increase in the productivity of even a few percent has a very significant influence on the overall costs of the final product.

As such, one of ordinary skill in the art would have lacked any reasonable expectation of success in achieving the surprising and unexpected results of the instant invention with the non externally heatable and separately regulatable heat exchanger of Link et al.

Applicants respectfully submit that Dummer et al. does not rectify the deficiencies of Link et al. Indeed, Dummer et al. does not deal with the cracking process itself but merely relates to the technology after the quench column. Therefore, even if one of ordinary skill in the art were to utilize a quench column in Dummer et al., there would have been no motivation to modify the heat exchanger of Link et al. and still no reasonable expectation of success in achieving the results of the instant invention.

With regard to the surprising and unexpected results of the instant invention, the Examiner had previously expressed doubt with regard to the results presented in light of DE 34 40 685. Dr. Benje has also addressed this in his Declaration.

According to Dr. Benje, it can be clearly seen from the Table on page 5 that the low-pressure process of DE 34 40 685 has a significant higher power consumption than the process according to the present application.

Dr Benje explains that the process according to DE 34 40 685 does not use a EDC vaporizer heated by cracking gases. Therefore, the energy consumption is 30% higher in the process according to DE 34 40 685 when compared to the process according to the present application. In addition to this total energy consumption mentioned above, also the refrigeration output for liquefying the hydrogen chloride at the top of the HCl column is much lower in the process according to the present application than in the process according to DE 34 40 685. Further, electricity has to be used as energy for liquefying the hydrogen chloride which additionally involves much higher costs for energy.

Dr. Benje provides a tabular presentation which clearly demonstrates that the method according to the present application makes it possible to obtain decisive advantages of low-pressure-cracking, a high yield, a low rate of by-product formation and a long operating time of the furnace

combined with a low-energy consumption that bears comparison with high-pressure cracking. Similarly, Dr. Benje demonstrates a considerable cost advantage associated with the present application when compared to the processes of the prior art.

As such, Applicants believe that the data provided more than sufficiently demonstrates the superiority of the instant invention.

In sum, Applicants respectfully reassert that there is no suggestion or motivation, either in the cited reference(s) or in the knowledge generally available to one of ordinary skill in the art, to modify the cited reference(s) to make the claimed invention, nor is there a reasonable expectation of success. Furthermore, the superiority of the present invention further rebuts any prima facie case of obviousness asserted.

Applicants respectfully submit that rejection under 35 U.S.C. §103(a) should be withdrawn.

**CONCLUSION**

In view of the remarks made herein, Applicant submits that the application is in condition for allowance. Favorable reconsideration of the application and prompt issuance of a Notice of Allowance are respectfully requested. If a telephone conference with Applicant's representative would be helpful in expediting prosecution of the application, Applicant invites the Examiner to contact the undersigned at the telephone number indicated below.

Applicant believes that no additional fees, other than the fee for the two-month extension of time, are required in connection with this paper. Nevertheless, Applicant authorizes the Director to charge any deficiency in the fees filed, asserted to be filed or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to Deposit Account No. 04-1105, under Order No. 64223(52059).

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Respectfully submitted,

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